IN THE CLAIMS:

1. (Canceled)

2. (New) A lithographic projection apparatus comprising:

an illumination system adapted to supply a beam of radiation;

a first object table adapted to be disposed in a path of said beam of radiation, said first object table being configured to hold a patterning device capable of patterning the beam of radiation according to a desired pattern to form a patterned beam of radiation;

a second object table adapted to be disposed in a path of said patterned beam of radiation, said second object table being configured to hold a substrate having a surface to be exposed, such that, when held on the table, the surface lies in a reference plane;

a projection system disposed between said first object table and said second object table, said projection system being configured to image the patterned beam of radiation onto a target portion of the substrate;

a positioning system configured to move said second object table between an exposure position, at which said projection system can image said patterned beam of radiation onto said substrate, and a measurement position; and

a calibration system configured to measure lateral displacements of a reference point in a plane of said second object table as a function of tilt, at said measurement position, wherein said calibration system comprises:

a diffraction grating mounted to said second object table;

an illuminator which generates a measurement beam of radiation and directs the measurement beam to be incident on said diffraction grating so as to be diffracted thereby; and

a detector which detects the position of said diffraction grating.

3. (New) An apparatus according to claim 2, wherein said grating is mounted substantially flush with a surface of said second object table on which said substrate is disposed.

4. (New) An apparatus according to claim 2, wherein said grating is disposed at a desired height relative to said reference plane.

5. (New) An apparatus according to claim 2, wherein said calibration system is constructed and arranged to measure displacements of a reference point in said reference plane and said diffraction grating is mounted substantially parallel to said reference plane on said second object table.

6. (New) An apparatus according to claim 2, wherein said calibration system further comprises a light guide which directs said measurement beam to be incident on said diffraction grating in a direction substantially independent of the tilt of said second object table, and said diffraction grating is an at least partially transmissive diffraction grating.

7. (New) An apparatus according to claim 6, wherein said illuminator is adapted to emit said measurement beam along an incident path substantially perpendicular to said diffraction grating, and said light guide comprises a plurality of reflectors mounted to said second object table behind said diffraction grating relative to said illuminator and positioned to reflect said measurement beam onto a return path parallel to said incident path and passing through said diffraction grating in a direction opposite to said incident path.

8. (New) An apparatus according to claim 7, wherein said plurality of reflectors comprises a transparent body having three mutually perpendicular faces at which said measurement beam undergoes reflection.

9. (New) An apparatus according to claim 6, wherein said light guide is imbedded in said second object table.

10. (New) An apparatus according to claim 2, wherein said illuminator is arranged to emit said measurement beam along an incident path substantially perpendicular to said diffraction grating and passing therethrough.

11. (New) An apparatus according to claim 10, wherein said calibration system further comprises a light guide including a retro-reflector mounted to said second object table behind said diffraction grating relative to said illuminator to reflect said measurement beam along a return path substantially parallel to said incident path and passing back through said diffraction grating

12. (New) An apparatus according to claim 11, wherein said retro-reflector comprises a plane-reflector and a condensing lens mounted at a distance substantially equal to its focal length from said plane-reflector.

13. (New) An apparatus according to claim 12, wherein said retro-reflector comprises a solid body of transparent material having a front surface curved to form said condensing lens and a plane rear surface partly reflective to form said plane-reflector.

14. (New) An apparatus according to claim 12, wherein said plane-reflector is sized and positioned so as to reflect substantially only the zeroth diffraction order of the measurement beam diffracted by its first passage through said diffraction grating.

15. (New) An apparatus according to claim 14, further comprising absorbent or diffusive surfaces in the plane of said plane-reflector outside the reflecting area thereof.

16. (New) An apparatus according to claim 11, wherein said retro-reflector comprises a corner-cube.

17. (New) An apparatus according to claim 2, wherein said calibration system further comprises an anti-reflection coating, said anti-reflection coating being applied onto at least one surface of said diffraction grating.

18. (New) An apparatus according to claim 2, further comprising a plurality of calibration systems configured to measure displacements of said second object table with tilt about a plurality of axes.

19. (New) A method of calibrating a lithographic projection apparatus comprising:

measuring a position of an alignment mark on a surface of an object table for holding a substrate having a surface to be exposed at different tilts;

calculating a distance between the surface of the object table and a rotation-invariant point of the object table; and

adjusting parameters of an electronic controller included in a positioning system for moving said object table between an exposure position and a measurement position so that said rotation-invariant point is at a predetermined vertical distance from the alignment mark of the object table.

20. (New) A method according to claim 19, wherein said measuring the position of the alignment mark on the surface of the object table comprises directing a measurement beam to be incident on a diffraction grating, provided on the object table, substantially independent of the tilt of the object table and detecting the position of said diffraction grating.

21. (New) A method according to claim 19, wherein said measuring the position of the reference point on the surface of the object table comprises directing a measurement beam along an incident path substantially perpendicular to a diffraction grating provided on the object table, and reflecting said measurement beam along a return path substantially parallel to the incident path and passing through said diffraction grating in a direction opposite to the incident path.

22. (New) A method of manufacturing a device using a lithographic projection apparatus, the method comprising:

endowing a beam of radiation with a pattern in its cross section using a patterning device to form a patterned beam of radiation;

projecting the patterned beam of radiation onto target portions of a substrate having a radiation-sensitive layer, said substrate being disposed on an object table; and

detecting displacements of a reference point of said object table at various angles of tilt when situated at a measurement position.

23. (Previously Added) A method according to claim 22, wherein said detecting displacements of the reference point of said object table comprises directing a measurement beam to be incident on a diffraction grating, provided on said object table, substantially independent of a tilt of said object table and detecting the position of said diffraction grating.

24. (New) A method according to claim 22, wherein detecting displacements of the reference point of said object table comprises directing a measurement beam along an incident path substantially perpendicular to a diffraction grating provided on said object table, and reflecting said measurement beam along a return path substantially parallel to the incident path and passing through said diffraction grating in a direction opposite to the incident path.

25. (New) A device manufactured according to the method of claim 22.